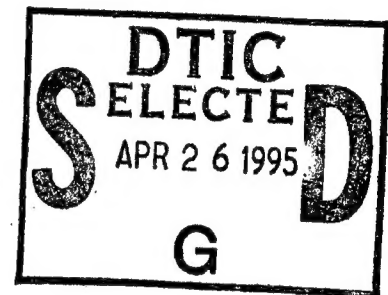


Battle Command Advanced Warfighting Experiments

Summary of January 1994 Experiments



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29 April 1994

Accession For	
NTIS	CRA&I <input checked="" type="checkbox"/>
DTIC	TAB <input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
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Availability Codes	
Dist	Avail and/or Special
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1995 0310 034

Battle Command Advanced Warfighting Experiments

Summary of January 1994 Experiment

Purpose

This interim report describes activities during the first of several advanced warfighting experiments (AWEs) conducted by the Battle Command Battle Laboratory (BCBL) at Fort Leavenworth, Kansas. The experiments are aimed at advancing the art of battle command, and are designed within the context of two activities associated with the U.S. Army Command and General Staff College (CGSC). These activities are the Battle Command Elective (BCE), a pilot course developed jointly by BCBL and CGSC, and the Prairie Warrior student exercise which will be conducted by the college in May 1994.

In addition to a brief background on the experimentation process and a description of the January 1994 events, the report also provides emerging insights from this initial AWE. The report was prepared by the Training and Doctrine Command (TRADOC) Analysis Center (TRAC) in support of BCBL.

Purpose

Document the January 1994 Battle Command Advanced Warfighting Experiment (AWE)

Highlight key insights derived from the AWE

COMBINED ARMS...DECISIVE VICTORY

Objectives

While the AWEs address several objectives, the principal focus is to support investigation of the Louisiana Maneuvers (LAM) issue assigned to BCBL, Holistic Review of Command, Control, Communications, Computers, and Intelligence (C4I). An implied task under this issue requires BCBL to develop and deliver the relevant common picture of the battlefield for the warfighting commander, and determine the modifications to the Battle Command Support System (BCSS) required to deliver this relevant common picture. The relevant common picture includes critical elements of information which a division commander and his staff share, wherever he is on the battlefield. The BCSS includes all aspects of support (staff members, staff processes, systems) which provide the relevant common picture. These are the primary objectives of the analytic support effort, and the other elements shown here are addressed to the extent that they support those principal goals or extend the vision for battle command experimentation.

Objectives

Holistic Review of C4I ...

Determine components of the relevant common picture for the warfighting commander

Determine capabilities required in the Battle Command Support System

Other experimentation objectives...

Understand ideas and power of information on the digitized battlefield

Explore bold changes to staff processes and CP design

Explore 21st Century classroom concepts

Exploit information technologies to enhance battle command

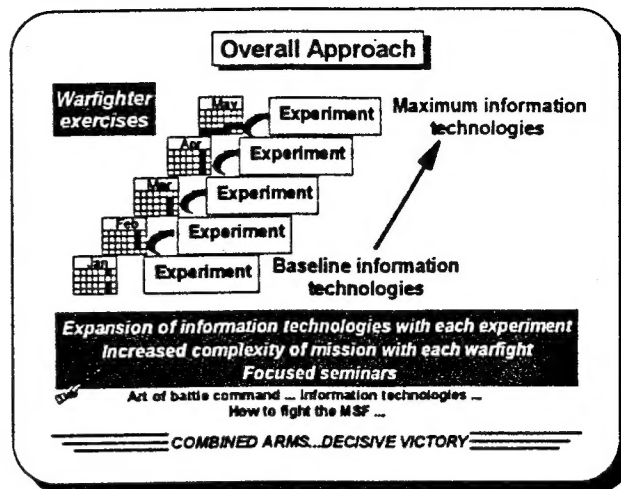
Train the Mobile Strike Force

COMBINED ARMS...DECISIVE VICTORY

Overall Approach

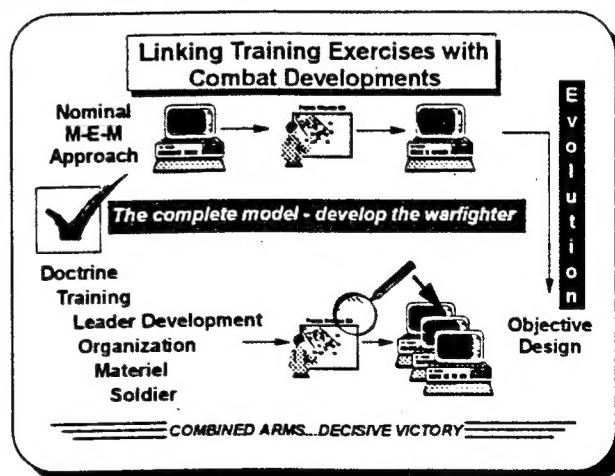
BCBL's initial concept called for five AWEs to be held from January through May 1994, one each month. Associated with each AWE is a warfighting exercise which provides a set-piece for exploring the relevant common picture. The experiments during the first four months comprise the BCE, and the May experiment is a subset of the Prairie Warrior exercise. The exercises begin from a baseline of limited information technology and move towards a digitized force, to investigate and identify components of the relevant common picture and useful capabilities to contribute to the development of that picture. CGSC students are

participants in the experiment, providing the key leaders and staff of an organization known as the Mobile Strike Force (MSF). This experimental force will be used by the Army to develop future concepts and organizations leading the Army to the 21st century, through interaction with leaders who will be senior Army leaders in the time frame when such a force might be fielded. In this series of experiments, the MSF is characterized as a 1998+ division-sized force. With each AWE, the MSF staff receives a mission order, and must develop plans to execute their assigned mission. The MSF Commander directs battle operations from a forward command post (CP), with selected key staff members; the remainder of the headquarters staff is located in a rearward CP, and conducts planning operations from that location. Subordinate commanders within the MSF are also physically segregated from the forward and rearward CPs. In addition to the warfighting exercises, a series of seminars provides information on battle command, information technologies, and warfighting concepts for the MSF.



Linking Training Exercises with Combat Developments

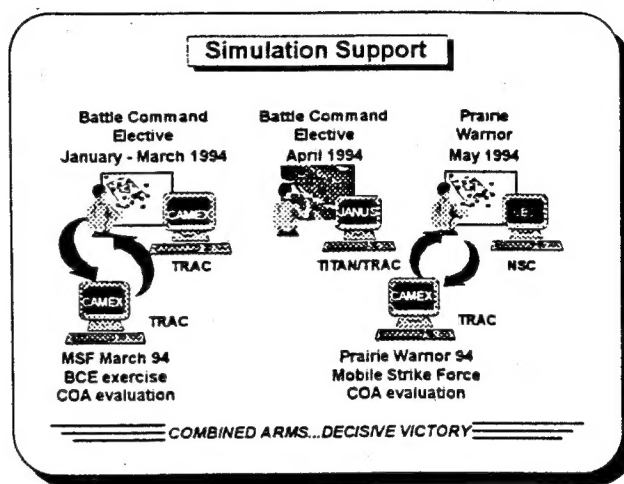
In a recent LAM study, TRAC explored the idea of using a training exercise as a basis for a combat developments scenario to investigate modernization issues, with some significant lessons learned on the process called "model-exercise-model" (M-E-M). This process nominally includes the use of a combat simulation to assist in fine-tuning exercise parameters; conduct and observation of an exercise; and replication of the exercise outcomes in the combat simulation for further investigation of alternatives. The planned use of the MSF in Prairie Warrior as an experimental force mirrors some aspects of the M-E-M process. A critical finding of the research highlighted the need to develop the warfighter prior to



the exercise, across the TRADOC domains of doctrine, training, leader development, organization, materiel, and soldier systems (DTLOMS). This is particularly key for the MSF staff, given a new organization, new combat systems and information technologies, developing doctrine, and leaders with little depth in division staff experience. While the BCE serves as an interim vehicle for this crucial development process, the initial course objectives had to be adjusted to allow student exposure to domains outside of BCBL's area of interest. As an objective capability, other Battle Labs must make a similar investment in development of these future warfighters within their areas of interest.

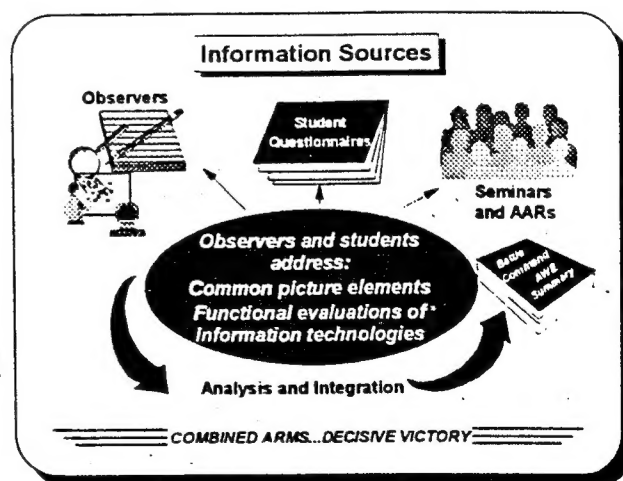
Simulation Support

Three simulation drivers are used in the experiments. The Computer-Assisted Map Exercise (CAMEX) model, developed and operated by TRAC, provides the exercise driver from January through March. It will also be used for a course of action (COA) evaluation tool in March and May. In April, the JANUS model will be used in conjunction with an archived National Training Center (NTC) rotation depicting a brigade-level operation. Operators will be provided by TITAN Applications for the April exercise, with the simulation inputs built by TRAC's Monterey office. During the May experiment, the Corps Battle Simulation (CBS) will be used as the MSF students join the rest of the CGSC students for Prairie Warrior. The National Simulation Center (NSC) provides the CBS model.



Information Sources

For all experiments, three principal sources of information are used. These include exercise observations, student questionnaires, and seminar discussions. Additionally, warfighter results, though not the primary focus, are also considered to develop insights. Observers use data collection forms to capture source, information type, content, recipient, means of transmission, and use of information shared among the warfighters. These inputs are entered in a data base of observations so that characteristics such as relative frequency of use, relative frequency of exchange requirements, common actions across staff functions, and other elements can be examined across all experiments to identify components of the relevant common picture. These data collectors also provide general observations about the exercise in addition to the structured observations; these general



observations are used to build after-action reviews and address secondary experiment objectives. A second source of information is responses from students on questionnaires. These focus on frequency of use, criticality, adequacy, and timeliness of each of the information types, and on identification of information requirements not provided during the exercise. They also elicit actual and preferred method of receipt for each information type. The final source of information is from discussions during BCE seminars. An after-action review (AAR) for each experiment provides a means of integrating insights and observations from all participants.

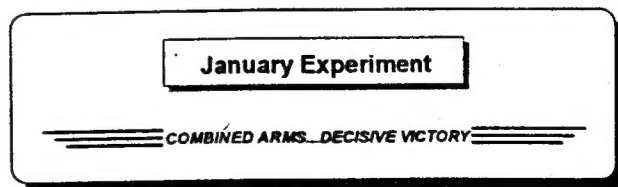
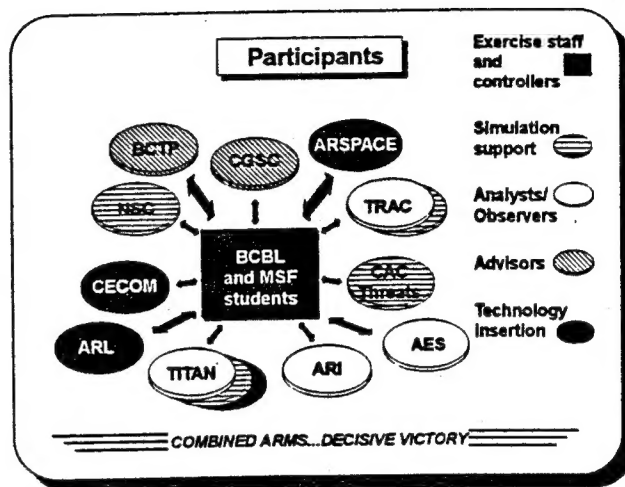
Participants

The experiments are conducted by BCBL's Experimentation Division. BCBL project officers design the experiments, develop the structure for each class meeting, coordinate all support requirements, serve as controllers for the exercises, and facilitate seminars and discussions. As indicated above, CGSC supports the exercises with student participants, and also provides instructors to assist BCBL in doctrinal issues, staff procedures, and educational and administrative requirements for the BCE. Analysis and simulation support is provided by TRAC, and the Army Research Institute (ARI) also conducts analysis for BCBL.

TITAN provides integrating support under a contract with BCBL, including observation support, simulation support, and technology insertion. NSC provides facilities for the experimentation, and will support the May exercise with CBS. Communications and Electronics Command (CECOM) assists BCBL with identification and integration of information technologies in the experiments. Combined Arms Command (CAC) Threats represents the opposing force (OPFOR) for the experiments through April, with the Battle Command Training Program (BCTP) World Class OPFOR providing that function in the Prairie Warrior exercise. The Army Tactical Command and Control System (ATCCS) Experimentation Site (AES) assists in the data collection effort with technicians and recording equipment for video, audio, and computer monitoring. Finally, U.S. Army Space Command (ARSPACE), Army Research Laboratory (ARL), and several other Army Research, Development and Engineering Centers (RDECs), laboratories, and defense contractors provide prototype systems to allow exploration of information technologies to enhance battle command.

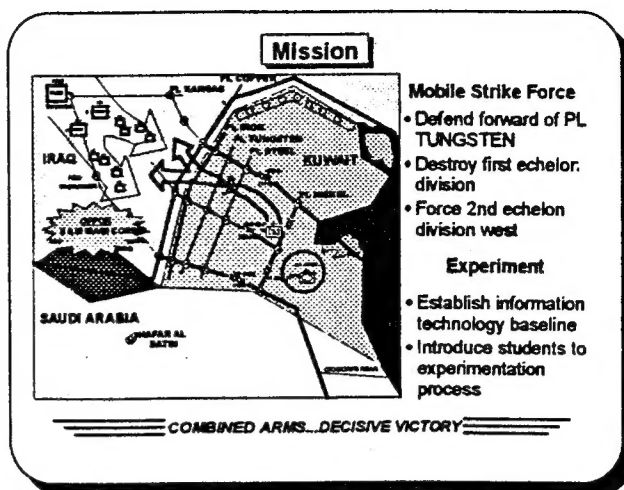
January Experiment

The remainder of this report specifically addresses the January experiment -- its characteristics and results, and a summary of insights. The BCBL project officer for the January through March experiments was MAJ Mike Schwind.



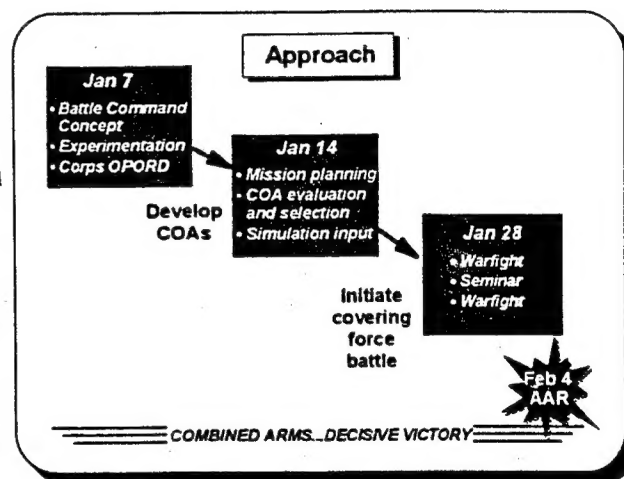
Mission

The MSF warfighting mission was to destroy the first echelon division of an attacking Iraqi corps in sector, and force the employment of the second echelon division to the west. The defensive mission was not envisioned as a typical one for the MSF, but was chosen as a less complex action in order to familiarize students with the simulation and the experimentation process. Missions in subsequent experiments will increase in complexity, culminating with an operational level strike in Prairie Warrior. On the experiment side, the January experiment was intended to establish a baseline capability in terms of information technology; specifically, some of the information technologies available to the MSF staff in January included phones, faxes, a rudimentary file transfer capability, and paper maps.



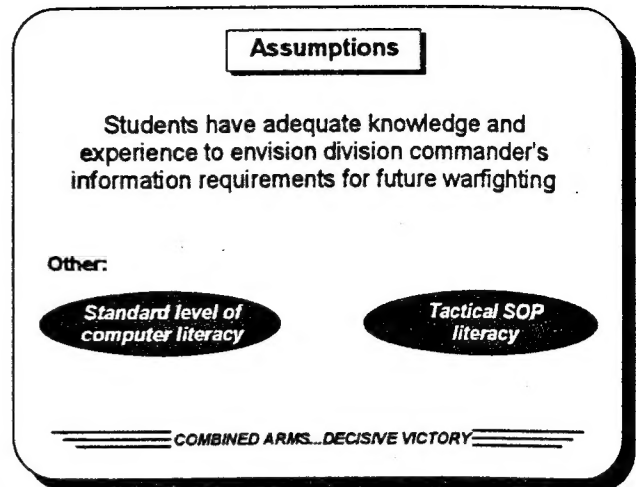
Approach

The first BCE meeting was 7 January 1994, a four-hour class day. An introduction to the Battle Command Concept was provided by COL John Eberle, Vice Director, BCBL. An overview of the battle command experimentation process and the elective was provided by LTC Ralph Burkhart, Chief, BCBL Experimentation Division. Students received a briefing on CAMEX, the exercise driver, and were issued a corps operations order (OPORD). The second BCE meeting was held on 14 January 1994, a six-hour class. Students brought in three COAs, and used this day to conduct mission planning, COA evaluation and selection, and development of CAMEX inputs. TRAC analysts used these inputs to simulate a portion of the battle between class meetings. The third day, 28 January 1994, was an eight-hour class. During this time, the students received a situation update, modified their plans, and fought two battle cycles. Between cycles, the first seminar on information technologies for subsequent experiments was provided. Battle results were briefed to the students on 4 February 1994, and an AAR was conducted to highlight observations and promote student feedback on the exercise. BCBL personnel served as controllers and corps staff. During all battle planning and execution sessions, a team of observers from TRAC, ARI, and TITAN completed data collection forms on the information flow as described earlier. Each observer was assigned to a principal Battlefield Operating System (BOS) and location (division forward, division rearward, or a brigade cell).



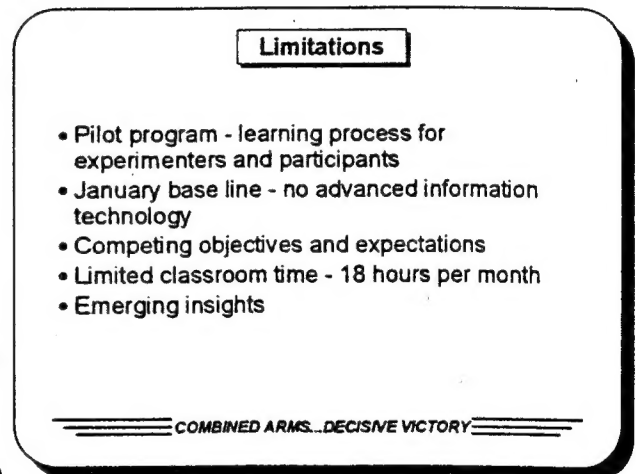
Assumptions

Across all of the Battle Command AWEs, the ability to identify elements of the relevant common picture hinges on the ability of students to project themselves as future senior leaders and envision future warfighting and information requirements. As a sanity check against this assumption, relevant common picture elements developed through the AWEs will be compared against commander's critical information requirements (CCIR) developed in 1985 with then-active Army division and corps commanders; students will also be asked to provide a ranking of those CCIR. The objective of these comparisons is to highlight and think through any noted differences in critical information elements. Additionally, the prototype BCSS developed through this process will be field-tested. The other items regarding automation and tactical standing operating procedures (SOP) literacy were actually implicit assumptions invalidated during the January exercise. These findings will be discussed in detail in the AAR section of this report.



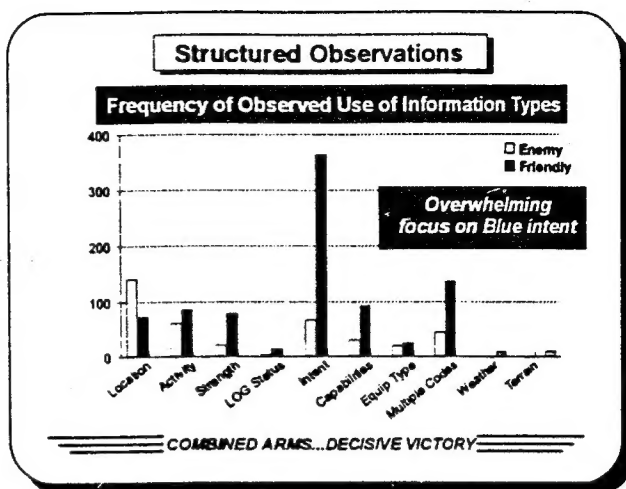
Limitations

As a pilot program, the BCE will require modifications to enhance its usefulness. Both student participants and the entire experimentation team will discover better ways to structure and conduct the process. The process must accommodate these changes, recognizing that analytic rigor competes with other objectives. Assumptions are challenged, new questions are asked, and in the course of adjusting to these influences, the process reaches a point where the experiments are better characterized as case studies. The January exercise highlights some areas where information technologies have the potential to improve battle command capabilities, but it is just the first of a series of AWEs, and emerging results here must be tempered at the end with the insights across all the experiments. The hours devoted to this elective are high compared to other CGSC electives, but are restrictive in consideration of the range of expectations for the MSF and the potential experimentation objectives. A possible solution may be to incorporate a new technologies elective and an advanced tactics elective with the BCE in future iterations. CGSC and BCBL are exploring other options as well.



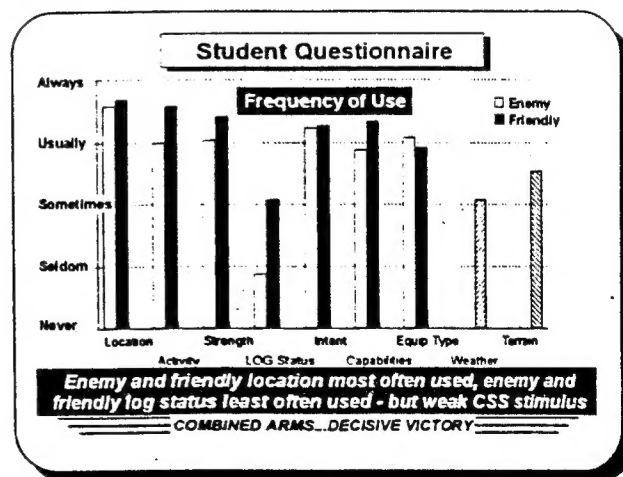
Structured Observations

Observers turned in data collection forms during the week following the final exercise day. TRAC created a data base of the January observations, and cursory comparisons have been made against student questionnaires, indicating fair agreement between information element frequency reported by students, and high-usage information elements reported by observers in the exercise except in one important area. The observers noted that friendly commander's intent was overwhelmingly the most frequently used information type, while students did not single out intent among the information types. The observations were likely skewed to highlight information which was verbally discussed or transmitted over faxes or electronic networks, with usage of status information provided by simulation outputs probably under-reported by observers. Even so, the focus on commander's intent reported by the observers is supported by serious differences in understanding of commander's intent in the various warfighting cells. The high frequency of observations in this area was attributed to the lack of a relevant common picture among the warfighters and the need to clarify intent. These insights are also discussed in the AAR section of this report. In addition to the structured observations, each data collector provided a brief summary of BOS issues and insights for the AAR. Observers also wrote a summary of their overall impressions of the exercise, highlighting any areas to be modified for the next experiment, and providing any emerging insights on the relevant common picture issue.

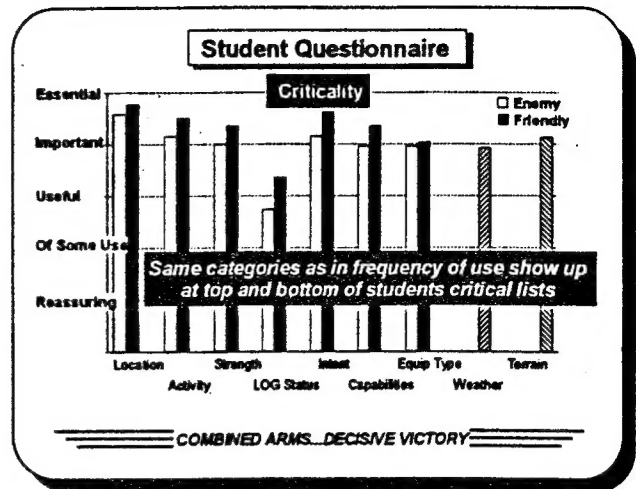


Student Questionnaire

The students assessed frequency of use, criticality, adequacy, and timeliness of information across the same information type categories used by observers - enemy and friendly location, activity, strength, logistics status, intent, capabilities, and equipment types, as well as "neutral" categories of weather and terrain. Unit locations for both enemy and friendly forces were viewed as the most frequently used as well as most critical information, although other categories, such as activity, strength, capabilities, and equipment type also ranked high in usage and criticality from the students' perspective. Concerning the enemy, the students basically wanted to know where is he, what is he doing, and what is he going to do? Enemy logistics information was seldom used and friendly logistics status was only sometimes used, while both were rated as the



least critical of types. However, combat service support (CSS) representation in the exercise driver for January was inadequate, and changes to subsequent experiments have been made to stimulate activity in this area. Enemy information types were all judged as less adequate and less timely than corresponding friendly types. The average adequacy ratings for all information types were below "reasonably adequate". With the incorporation of new technology there should be an increase in the adequacy and timeliness ratings. Additional comments from the student questionnaire with respect to specific BOS have been incorporated in the AAR section.



Seminar Discussions

Only one technology seminar was held during the January experiment, introducing students to three ARSPACE systems - the Space Enhanced Command and Control (SPEC2) system, the Mission Planning Rehearsal System (MPRS), and Multi-Spectral Imagery (MSI). This seminar was the first phase (talk) of a talk-touch-use methodology adopted by BCBL to introduce information technologies. Throughout the experiment, students volunteered many comments regarding future information technologies. The February/March 1994 experiment summary will address these capabilities in detail since these technologies will be used in the March warfight.

Warfighting Insights

The MSF defeated the enemy lead division; however, two battalions of the first brigade were literally destroyed by enemy attack helicopters during the battle. This highlighted a gap in the organic air defense artillery (ADA) capability of the MSF. While corps or theater level ADA protection may be available, it must provide continuous coverage against low flying, rotary wing aircraft with standoff capabilities which overmatch current direct fire ground maneuver and organic division ADA capabilities. Any solution which relies on assets from higher headquarters must consider not just this defense in sector, but the more complex tasks which may be associated with missions assigned to the MSF, including extremely rapid movement over great distances. Proposed organic solutions must also consider these tasks in assessing structure requirements -- for example, if a proposed solution does not have an "acquire and shoot on the move" capability, a backup or redundant capability must be provided. A second observation was that some of the new combat technologies, such as the sense-and-destroy armor (SADARM) munition, were not employed in the exercise. Capabilities of the combat systems were described in a battle book provided to students, but the volume of information to be digested in the January experiment may have been too great to allow exploration of all these capabilities. A seminar from the TRADOC Battle Lab Integration and Technology Directorate (BLITD) on "How to Fight the MSF" is scheduled during the April exercise. BLITD developed the organization of the MSF and will highlight the combat technologies during that session.

AAR

Insights from all sources were merged to provide an AAR for student participants. The AAR was intended to provide feedback to the students on battle outcome and staff procedures, and to stimulate discussion among students, BCBL controllers, and data collectors/observers

regarding the exercise, the relevant common picture elements, and the art of battle command. A summary of insights was prepared for each BOS. Insights were initially developed from observer input; student contributions to the process have been incorporated at the bottom of each BOS slide. LTC Burkhart facilitated the AAR, which was scheduled for a very short two hours.

After-Action Review

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Battle Command

The two assumptions regarding standard levels of computer literacy and familiarity with tactical SOPs were clearly invalid. While some students were quite at ease with the automated file transfer capability, most were not comfortable with the process. Likewise, no common understanding of SOPs existed, and students confirmed that the division tactical SOP had not yet been provided at this point in the CGSC curriculum. The staff experienced great difficulty in updating the status of friendly forces. The division rearward tried unsuccessfully to institute some standard reporting procedures. Voice was used as the

primary communications system but was limited, probably unrealistically, without a conference call capability. Brigades were called by several different division staff officers to provide the same information, primarily about friendly force status and location. Brigade commanders were provided information developed by their own assets, and relied on division to provide periodic updates from other sources. The many questions regarding adjacent, lower, and higher units pointed out the necessity of a common picture of the battlefield and an understanding of the elements which could influence the MSF area of operations. Students observed that face-to-face discussions with the MSF Commander were extremely useful in clarifying issues. They also commented on the limitations of the file transfer capability, indicating that training requirements for information technologies should be minimal. If the method for using the tools is not intuitive, their value is diminished. In the context of the information age, this observation takes on greater importance: structured training programs may not be able to keep pace with the explosion in information technologies.

Battle Command

Observer Insights:

- No standard level of familiarity with reporting tools
 - Tactical SOP
 - File transfer
 - Report formats
- Voice net widely used
 - Voice is primary communications system for battle command
 - Lack of conference call capability
- Multiple requests for same information
- Exercise lacked full spectrum of information sources
 - Adjacent, lower, higher, etc.

Additional student comments:

- Face-to-face discussions most productive
- Tools must be designed for intuitive use

COMBINED ARMS...DECISIVE VICTORY

Maneuver

Division forward and division rearward cells had different perspectives concerning the covering force battle. The commander believed the covering force was still in contact, while the staff in division rearward thought the force had withdrawn. Several other instances of disconnects between forward and rearward cells were noted throughout the exercise. The requirement to maintain a continuous common picture is underscored by these events and the associated divergence of effort in response to the events. This BOS also highlighted the effectiveness of face-to-face discussions, as the brigade commanders' awareness of the MSF

Commander's intent was heightened during his personal visits to the brigade cells. The division rearward did not receive the benefit of face-to-face discussions. Controllers noted that technology can help overcome some simple, but potentially devastating problems in maintaining the common picture. In the case of scale transfers, eight kilometers of the MSF sector were "lost", or left open, because the right boundary was not correctly posted. Student contributions to this BOS highlighted the need to consider new terms for split-based operations, and to reflect on the benefits of staff discussions around a wall-size map that you can write on - VTCs, common picture displays, pen-based graphics, and other information technologies will certainly introduce a change to this process, and all relevant aspects of that change must be assessed.

Intelligence

No clear procedures were established for highlighting priority intelligence requirements or other critical intelligence. In the case of threat helicopters, an error in interpretation over the size of the force (ten battalions instead of the actual ten companies) led to dismissal of the report as infeasible. Some confusion over clock time versus simulation time reinforced the notion that the threat was minimal. The maneuver brigade facing the threat took appropriate action to counter with their attached ADA platoon, and advised division to move additional ADA assets up, but no action was taken by the rearward CP. The brigade ADA and direct fire assets were overmatched by the standoff capability of the threat attack helicopters, and the enemy virtually destroyed two battalions of the first brigade. The ad hoc targeting cell may be a seed for future investigations of CP redesign; students will need to explore the makeup of that cell, as their initial grouping excluded fire support

Maneuver

Observer insights:

- Covering force situation confused
- Commander's intent
 - Brigades understood and reacted to changes in situation
 - Division rearward, in planning HQ role, not clear on commander's intent for 2nd brigade counterattack
- Operations graphics not updated
 - 1-23 Cav screen on right flank, but graphics showed it on left
 - Transfer of graphics from 1:250,000 to 1:100,000 scale map

Additional student contributions:

- "Division rearward" label does not imply planning cell
- Limited requirement to update
- Improvements to be gained from common picture electronic map - but don't overlook challenges of "paperless" operations

===== COMBINED ARMS...DECISIVE VICTORY =====

Intelligence

Observer insights:

- Procedures for processing "hot" intel unclear
 - e.g., enemy attack helicopter units
- No specific targeting cell
 - Ad hoc cell created

Additional student contributions:

- Intel function suffers most from compressed staff - redesign experiment parameters to reduce fusion aspects and focus on higher level functions

===== COMBINED ARMS...DECISIVE VICTORY =====

representation. Finally, student reactions to the volume of intelligence and snapshot nature of the information indicated new procedures were needed to update the staff during subsequent experiments and bring more realism to the exercise. A mid-exercise update of graphically-oriented locations and strengths supplemented textual information, and was a principal source of information during the remainder of the warfight; it provided a consolidated, coherent picture of status, but it did not overcome the concerns about a snapshot image.

Mobility/Countermobility/Survivability

The contributions of CGSC students and their willingness to accept challenges were evidenced in the choices made during the exercise. The COA adopted for the January experiment was not the simplest scheme presented, but reflected, in the MSF Commander's eyes, alignment with the concept of mobility. This choice, however, complicated the synchronization of supporting assets. A lengthy discussion of the scheme of maneuver was required to draw out the MSF Commander's intent in terms that could be translated into support requirements. Status reporting, to account for assets, strength, and utilization, was also a consuming process, and seemingly routine tasks, such as dissemination of the division obstacle plan, was a laborious process without the capability to transmit large overlays. The obstacle overlay was cut into small pieces and fed through the fax machine to one destination at a time.

Mobility/Countermobility/Survivability

Observer insights:

- Complex scheme of maneuver required extra effort in matching supporting efforts
- Large amount of time devoted to status reporting
- Difficulty in disseminating division obstacle plan

Additional student contributions:

- Despite challenges, commander selected more complex COA in keeping with intent of "Mobile" Strike Force

===== COMBINED ARMS...DECISIVE VICTORY =====

Fire Support

The fire support officer (FSO) was not an integral part of the ad hoc targeting cell created in the division rearward. Others were explicitly directed to plan/coordinate deep operations, while the FSO was directed to determine and update the status of each artillery battery instead of achieving a balance between status, near term, and far term planning. Confusion about initial task organization may have also contributed to the low usage of cannon artillery assets at division. During the initial battle cycle, 1st brigade lost five artillery batteries. Although there was some discussion of cross-leveling or changes to task organization after the losses, no changes were implemented. Prior to the exercise, one of the students reviewed the MSF artillery structure, which is quite different from a typical division, and raised the significant issues

Fire Support

Observer insights:

- FSO not an integral part of targeting cell
- Very little use of cannon artillery, none by division
- Fire support losses by 1st brigade didn't generate changes to the FS task organization

Additional student contributions:

- Pre-exercise issues - priority of fires not responsive to main effort, unclear relationships with corps artillery units, tactical resupply challenges, C2 challenges without Divarty

===== COMBINED ARMS...DECISIVE VICTORY =====

identified here. The controllers chopped an artillery brigade from corps to the MSF in response to some of these concerns, but the issues remain unresolved.

Air Defense

The imbalance in branch representation across the MSF may have generated some of the issues which turned up in the ADA BOS. The lone division Air Defense Officer (ADO) was located in the division rearward, although little coordination occurred between the ADO and other staff officers within that warfighting cell. With most of the ADA assets task organized to the brigades, the division ADO had limited influence and was engaged in tracking status most of the time. The situation which led to the loss of maneuver battalions to enemy attack helicopters was not explored in the solutions mode until late in the exercise, and no action was taken by division. The ADO questioned whether the position should be located in the division forward; these and other CP configurations issues cannot be isolated for examination in the current set of Battle Command AWEs, but may serve as a start point for future experimentation.

Air Defense

Observer insights:

- Little coordination between Div ADO and other division rearward elements
- Task organization of air defense assets limited ADO influence
- No effective ADA counter to enemy attack helicopter standoff

Additional student contributions:

- CP configurations issue

===== COMBINED ARMS DECISIVE VICTORY =====

Combat Service Support

As with the mobility, countermobility, and survivability BOS insights, the complexity of the scheme of maneuver is generally reflected in the details of the support concept. However, in this case the experiment did not provide an adequate catalyst to spark activity in the CSS area. With the limited duration of the exercise, there was no detailed casualty reporting, replacement activity, estimates of supply class usage or forecasts, or cross-leveling of units based on losses. There was also a lack of understanding of appropriate reports and actions, complicated by an unfamiliar force structure and future systems.

Combat Service Support

Observer insights

- Support concept unclear
- Not a clear understanding of SOP reports and reporting process
- Limited exercise duration

Additional student contributions

- Exercise did not generate enough CSS activity

===== COMBINED ARMS DECISIVE VICTORY =====

Effects on 1994 AWEs

During the January warfight it was apparent that modifications to future experiments were required. The varying levels of computer literacy across the BCE students illustrated that technology insertion cannot be successful without adequate training. The February warfight was cancelled in order to devote more time to familiarization with the information technologies to be introduced in March, including those which were originally assumed to be intuitive. The February experiment was intended to provide an interim set of information technologies, but not all those under consideration; instead, the March experiment design was modified to incorporate all four information technologies identified by BCBL as hypothesized components of the relevant common picture: electronic messaging, electronic map display, electronic status reporting, and videoteleconferencing. New ways to stimulate CSS activity and address the intelligence buildup were developed for March, incorporating the electronic messaging capability and the automated status reporting system which included classes of supply and major systems. A fifth class of information technologies, an automated COA evaluation capability, was also identified for the March exercise. Finally, with the introduction of a full range of information technologies, the need to conduct a functional evaluation of each of the newly introduced capabilities became apparent, and approaches to this issue were developed, principally by ARI.

Effects on 1994 AWEs

- February warfight cancelled
- March warfight expanded
- More time devoted to information technologies hands-on efforts
- Logistics visibility enhanced
- Intelligence picture builds - not a snapshot
- Enhanced user interface with simulation driver
- Addition of COA evaluation tool
- Functional evaluation approaches developed for information technologies

COMBINED ARMS...DECISIVE VICTORY

Lessons Learned for 1995 and Future Efforts

The initial experiment kickoff on 7 January 1994 was preceded by an brief, intense planning process. The cutoff for determining the composition of the MSF has to be sufficient to allow representation in the simulation driver, both for BCE and for the culminating exercise, Prairie Warrior. Introduction of a new MSF Force concept in February 1994 and a new organizational structure in March 1994 could not be accommodated in any of the remaining AWEs and still accomplish the objective of developing the warfighter for the exercise. To have a positive impact on future excursions with the MSF, there must be earlier involvement by both the concept developers and other battle labs. This will introduce the students to employment options and future combat technologies far more effectively than by diverting BCBL's focus from their mission. The BCE, or some similar process, is crucial to ensure that experiments conducted

Lessons Learned for 1995 and Future Efforts

To take MSF farther into the future:

- Earlier involvement by concept developers required
- Investment by other battle labs required for combat technologies - some untested
- BCE or other process critical for mingling training and combat development objectives in exercise context
- Keep expectations reasonable

*Highly motivated, innovative students
are a valuable asset for advancing the
art of battle command*

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within the context of a large, expensive training exercise are worthwhile. Even so, expectations must remain reasonable. As an example, time frames for the training and combat developments objectives must be fairly close to maintain a plausible connection within the exercise framework. As indicated above, the CGSC students are a vital source of input for investigation of future battle command issues, bringing experience without undue bias, and innovation without parochialism.

Summary of Key Insights

Highlights of the January insights across the DTLOMS indicate the value of this process, the challenges of developing the future Army leader, the promise of the information age, and the widespread impact of digitization. Although many of the insights are simple, they confirm our roots and recognize the challenge to our educational process. The BCE provides a mechanism to lead technology in a direction which supports battle command, rather than adapt battle command to fit independently-developed technologies.

Summary of Key Insights

- D New terms required for split-based operations**
 - Division "rearward" seen as support only, not planning
 - Brigades felt obliged to provide update on resource status, not complete situation
- T Digitization of the battlefield cannot be achieved simply through insertion of technology**
 - No standard level of competency in use of automation
- L Voice, particularly face-to-face, most effective means of communication**
 - Brigades understood changes in commander's intent through visit from division commander
 - Division rearward not clear on changes -- no face-to-face discussions
- O MSF organic air defense inadequate**
 - Two maneuver battalions destroyed -- no effective organic counter to enemy helos
 - Continuous corps and/or EAC support required
- M Baseline capabilities do not support maintenance of common picture**
 - 8 kilometer gap in division boundary from map scale transfer error
 - No way to transmit large overlays, operations graphics not updated
- S Information technologies must be intuitive**
 - Training burden must be reduced to keep pace

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